

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

What is claimed is:

1. A method of fabricating a slot in a print head substrate, comprising:
dry etching through a first surface of the substrate having a thickness
between the first and a second opposing surfaces; and,
5 sand drilling through the second surface of the substrate effective to form,
in combination with said etching, a slot at least a portion of which passes entirely
through the thickness of the substrate.
2. The method of claim 1, wherein dry etching through the first surface
10 comprises dry etching through a thin film side of the substrate.
3. The method of claim 1, wherein said dry etching removes from about 25
percent to about 75 percent of the thickness of the substrate.
- 15 4. The method of claim 1, wherein said dry etching removes about 50 percent
of the thickness of the substrate.
5. The method of claim 1, wherein said sand drilling forms a portion of the slot
having generally curved surfaces.

6. The method of claim 1, wherein said dry etching forms a portion of the slot defined by generally planar surfaces.

7. The method of claim 6, wherein said generally planar surfaces formed by said dry etching are generally orthogonal to the first and second surfaces.

8. The method of claim 1, wherein said act of dry etching is performed before said act of sand drilling.

9. A fluid ejecting device having a substrate formed in accordance with the method of claim 1.

10. A method of forming fluid handling slots in a semiconductor substrate having a thickness between opposing first and second surfaces comprising:

dry etching into the substrate from the first surface to form a first trench having a length and a width; and,

removing substrate material through the second surface to form a second trench, wherein at least a portion of the first and second trenches intersect to form a slot through the substrate, and wherein the slot has an aspect ratio of greater than or equal to about 3.

11. The method of claim 10, wherein said removing comprises one or more of: sand drilling, laser machining, dry etching, wet etching, and mechanical drilling.

12. The method of claim 10, wherein said act of dry etching is performed
5 before said act of removing.

13. The method of claim 10, wherein said dry etching comprises multiple acts of dry etching, wherein subsequent individual acts of dry etching remove shorter lengths of substrate than previous individual acts of dry etching.

10

14. The method of claim 10, wherein the second trench formed by said removing has a maximum width of less than or equal to about 240 microns.

15. The method of claim 10, wherein the second trench formed by said
15 removing has a maximum width of about 50 percent or less the thickness of the substrate.

16. The method of claim 10, wherein the second trench formed by said

in which a through hole occurs that is approximately

17. The method of claim 10, wherein the second trench formed by said removing has a length at a region where breakthrough occurs that is about 25 percent to about 75 percent the length of the first trench where the trenches intersect to form the slot.

5

18. The method of claim 10, wherein the first trench formed by said dry etching has a depth of about 25 percent to about 75 percent of the thickness of the substrate.

10 19. The method of claim 10, wherein the second trench formed by said removing has a maximum width of less than or equal to about 300 percent the maximum width of the first trench formed by said dry etching.

15 20. A fluid ejecting device having a substrate made in accordance with the method of claim 10.

21. A method of forming slots in a semiconductor substrate having first and second opposing surfaces comprising:

dry etching a first trench through the first surface of the substrate; and,

creating a second trench through the second surface of the substrate

5 effective to form, in combination with the first trench, a slot at least a portion of which passes entirely through the substrate, wherein the maximum width of the slot is less than or equal to about 50 percent of the thickness of the substrate..

22. The method of claim 21, wherein said creating a second trench comprises
10 sand drilling.

23. The method of claim 21, wherein said creating a second trench comprises wet etching, dry etching, mechanical drilling, or laser machining.

15 24. The method of claim 21, wherein said dry etching comprises dry etching into a thin film side.

25. The method of claim 21, wherein said dry etching and said creating form a slot having a configuration that reduces bubble accumulation.

26. The method of claim 21, wherein said act of dry etching is performed prior to said act of creating.

27. One or more computer-readable media having computer readable
5 instructions thereon which, when executed by a computer, cause the computer to:

cause material to be removed from either the first or second surfaces of a semiconductor substrate; and,

cause a dry etch to be made through the other of the first or second surfaces
of a semiconductor substrate effective to form in combination with said removed
10 material, a slot to be formed, at least a portion of which passes entirely through the
substrate and wherein the slot has a maximum width that is less than or equal to
about 50 percent of the thickness of the substrate.